Problem Set 1 Hints / Clarifications

due February 10, 2011

4. Single character changes

   i It will be hard to draw pictures for unknown NFAs, so setting up the formal notation correctly will help.

   ii Start with L and transform it somehow into D(L) using the closure properties of concatenation, union, intersection, Kleene star, homomorphism, and inverse homomorphism. An inverse homomorphism h^{-1} is like applying a homomorphism h backwards; $h^{-1}(w)$ is a set containing every string that could become w through the homomorphism. Formally, for a homomorphism $h : \Sigma_1 \to \Sigma_2$ and language L over alphabet Σ_2, $h^{-1}(L) = \{w \in \Sigma^* \mid h(w) \in L\}$
   For example, define:
   $h : \{0, 1\} \to \{a, b, c\}$
   $h(0) = h(1) = a$
   and some language $L = \{a\}^*$
   $h^{-1}(L) = \{0, 1\}^*$
   Also keep in mind that we can assume any language with a regular expression is regular.